

# HOME FIRE HAZARDS

Every 15 seconds, a fire department responds to a fire somewhere in the United States. A residential fire occurs every 66 seconds. There is one civilian fire death every 118 minutes. There is one civilian fire injury every 18 minutes.

## The Nature of Fire

Fires are likely to start in many places in the home including the kitchen, living room, bedroom and storage areas such as, the attic, basement, workroom or storeroom. Causes of fire include overheated or overloaded electrical wire, cigarette ashes, smoldering ashes in the couch, sparks from the fireplace, unattended fires and barbecues, appliances in poor repair and unattended cooking in the kitchen.

To understand the dangers of fire in the home, first understand the nature of fire. Fire occurs any time four elements are present - fuel, heat, oxygen and the chemical chain reaction. When these four elements are together, fire occurs. If any one element is removed, fire is prevented. These elements are collectively known as the "Fire Tetrahedron" or the "four faces" of fire.

Fuel, such as wood, paper or clothing (essentially anything that can burn) provides the energy for the fire. Oxygen, found in the air we breathe, is required for the burning process to occur. Heat provides a source of ignition, such as a match or a lighter, and causes the continued vaporization of solids such as wood in flammable gases. The chemical chain reaction or high molecular activity is needed to keep the fire burning. If any one of the four components is missing, fire cannot start. Removal of any one of these four causes fire to be extinguished. When fire occurs, an oxidation/reduction reaction takes place. This chemical term means a fuel, such as wood, is "reduced" in form in the presence of an oxidizing agent, oxygen and changes chemical make-up. Fire and heat cause the wood that is composed primarily of hydrogen and carbon molecules, to decompose thereby releasing energy in the form of more heat and flame. The wood is reduced and gives off carbon

dioxide and hydrogen gases into the atmosphere and turns into ash (primarily carbon molecules).

Products with a high carbon and hydrogen content are the most effective fuels or "reducing agents." The most common of these are "complex hydrocarbons" such as gasoline, propane, butane and natural gas.

An oxidizing substance provides oxygen that is necessary for the burning or oxidations/reduction process to happen. The purest oxidizing substance is oxygen gas itself. Of the air we breathe, 21 percent is composed of oxygen. Thus, air is the most common oxidizing substance found. Other oxidizing substances include chlorine, bromide, iodine and ozone. For something to burn, it must first reach ignition temperature. Consider an unintentional fire in a trashcan. A match that burns at more than 400 degrees Fahrenheit is dropped into a trashcan. The embers ignite paper in the can and a fire begins. Once the fire starts, significant heat is generated. This heat causes unburned paper next to the flame to increase its molecular activity. The unburned paper vaporizes and turns to a gas. This flammable gas provides more fuel to the fire and it continues to burn.

The chain reaction means that the burning process must be allowed to continue in order for fire to burn. The collision of molecules in the oxidation/reduction process causes heat to build up, which sustains the combustion process.

Anytime just one of the four sides of the fire tetrahedron is removed, the possibility of fire is eliminated. A home fire inspection does just that. When a fire hazard is identified, one side from the fire tetrahedron has been removed. For example, we know that "Smokers Need Watchers." If a live cigarette ash is discovered behind a couch after a party and extinguished, the heat side of the fire tetrahedron is eliminated.

If a pile of rubble lying next to the house is discarded, the fuel for a potential fire is removed from the fire tetrahedron. If a grease fire is covered with a lid, oxygen is removed from the fire tetrahedron. If the fuel cells are removed from a nuclear reactor, the chain reaction is reduced.

# Home Inspection

One of the best ways to prevent fire in the home is to do a home inspection specifically looking for the fire hazards or preparing for emergency measures in case of a fire. Inspect your home one section at a time:

## Kitchen

All electrical appliances and tools should have a testing agency label. Have the appliances repaired if they aren't working right. If an appliance gets wet, have it serviced.

- Check the cords on all appliances. If they are worn or frayed, have them repaired.
- Don't overload the outlets.
- Make sure appliance cords are kept on the counter to prevent them from being pulled down by young children.
- Don't store things over the stove. People get burned while reaching.
- Turn pot handles so children can't pull them down.
- Wear tight sleeves when cooking. Loose-fitting garments can catch fire.
- Check to see if curtains or towel racks are close to the stove.
- Check to see if the stove and oven are clean of grease and oil.
- Be sure a fire extinguisher is placed in the kitchen. The Fire Department recommends a minimum 2A10BC extinguisher.
- All cleaning products and other chemicals should be stored out of the reach of young children, not under the sink. Cleaning products and other chemicals also should be stored separately from foods.
- Be sure microwave ovens have room to "breathe," all the vents are cleared of obstructions.

## Living room or family room

- Be sure portable space heaters are at least three feet away from anything that can catch fire including walls and curtains.

- Use a metal or glass fireplace screen. Have the chimney checked and cleaned regularly.
- Put lighters and matches where small children won't find them.
- Too small or too full ashtrays are no good. Ashtrays should be large, deep and emptied frequently, but only when all signs of heat and burning are gone.
- Before going to bed, look under cushions for burning cigarettes. Check carpeting where ashtrays have been used.
- Allow plenty of air space around the TV and stereo to prevent overheating. If these appliances are not working correctly, be sure to have them repaired. In the meantime, unplug them.
- Check for worn or frayed extension cords or other electrical cords.
- Extension cords should not run under rugs and carpets or be looped over nails or other sharp objects that could cause them to fray.
- Check for overloaded outlets or extension cords.
- Electrical sockets should be covered with a childproof fitting.
- Lamp and light fixtures should be used with bulbs with wattage at or below maximum prescribed by the manufacturer.

## **Bathroom**

- Check for overloaded extension cords and outlets.
- Don't place or use any appliances near water.
- Make sure all medicines and cosmetics are kept out of the reach of small children. Install safety latches on drawers, cupboards and medicine cabinets if the home has small children.
- Dump old or outdated medicine into the toilet.

## **Bedrooms**

- Smoke detectors should be tested regularly to be sure they are functioning correctly.
- Have a working flashlight next to each bed.

- Again, check for overloaded outlets, extension cords and heaters that are too close to combustible items.
- Each member of the family should know what to do in the event of a fire.
- Do all family members know the fire escape plan?
- Plan two escapes from each bedroom in case of a fire.
- If you smoke, **DO NOT** smoke in bed.

### **Basement, Garage and Storage**

- Store gasoline and other flammables in tight metal containers. Don't use flammable liquids near heat, a pilot light or while smoking.
- Clean up workbench.
- If a fuse blows, find the problem. Be sure to replace a fuse with one the correct size.
- Get rid of stored newspaper or other rubbish. Newspapers stored in a damp, warm place may ignite spontaneously.
- Oily, greasy rags should be kept in labeled and sealed non-glass containers, preferably metal.
- Keep all chemicals, paints, etc. in their original containers.
- Set your water heater at 130 degrees Fahrenheit.

### **Outdoors**

- Don't ever use gasoline on a grill. Once the fire has been started, never use lighter fluid or gasoline. Use dry kindling to revive the fire.
- Move the lawnmower away from gasoline fumes before starting. Allow the engine to cool before refueling.
- Install a lightning protection system.
- Don't store more of anything than is needed.

### **Things to Think About**

- Smoking in bed, in a chair, or on the sofa when tired, drinking or under medication.

- Spraying aerosols while smoking or near a range or other ignition sources.
- Using a cigarette lighter after spilling fluid on the hands or clothing.
- Single deadbolt locks with inside thumb turns wherever possible. When a double key deadbolt is used, such as in a door with windows or other openings, a key should be left in the interior lock whenever anyone is inside the home.
- If window security bars are desired, install or retrofit windows with bars that have a single action quick release. Every bedroom must have minimum of one exit that can be opened to the outside of the home. You must be able to use the exit without special tools. A key is considered a special tool. The Fire Department advises that bars on windows should have a single action quick release device.